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## Preliminary Drainage Report

for

Mike Reynolds Apartment Complex  
50 & 60 Oak Creek Boulevard  
Sedona, AZ 86336

APN 408-08-053 & 054

October 13, 2018

By



Date Sealed October 13, 2018

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Date: October 13, 2018

## I. General Location and Description:

### A. Location

- 1) Owner: Mike Reynolds
- 2) No lot number, APN 408-08-053 & 054
- 3) City: Sedona, Arizona ( Yavapai County)
- 4) Streets: The site fronts on Oak Creek Boulevard
- 5) Major Drainage Ways: There are no major drainage ways that affect this property.
- 6) Surrounding Property: Currently the Red Rock Car Wash lies to the north, Oak Creek Boulevard lies to the west, and private residential properties lies to the south and to the east.

### B. Description of Property:

- 1) Area: Approximately 0.56 acres (0.26 for 50 Oak Creek Blvd and 0.30 for 60 Oak Creek Blvd
- 2) Ground Cover: The site is currently developed and covered irrigated grasses and trees.
- 3) The property is not subject to any offsite drainage.
- 4) Irrigation Facilities: A drip irrigation system will be used in landscape areas.
- 5) Proposed Land Use: Residential apartments.

## II. Drainage Basin and Sub-Basins:

### A. Major Basin Description

- 1) There is no Major Drainage Basin that drains onto this lot.
- 2) The site consists of native silty sands with some clay.

- 3) An on-site Detention Facility is not required for the new structure other than for first flush.

#### B. Sub-Basin Description

- 1) There is no sub basin that runs through this property.
- 2) The off-site drainage flow patterns in the developed condition will not hinder the surrounding properties.

### III Drainage Design Criteria

- #### A. Regulations: No deviation from the accepted regulations are included in this design.

#### B. Development Criteria and Constraints

- 1) No previous drainage studies for this particular site are known to have been made.
- 2) There is no impact to existing streets, there are existing structures on this site.

#### C. Hydrologic Criteria and Results

- 1) Design rainfall, or precipitation, is as taken from the tables 8.2 and 8.3 from the City of Sedona Land Development Code. These values were then incorporated into the Rational Method as described in the ADOT Highway Drainage Design Manual Hydrology dated March, 1993.
- 2) The runoff calculation method is the Rational Method.
- 3) Detention discharge & volume method is by the Rational Method.
- 4) The recurrence interval used for the on-site drainage is 2, 10, 25 and 100 year, 10 minute, with a 60 minute design criteria for the sizing of the detention basins.
- 5) No other calculation methods are used in this study.

#### D Hydraulic Criteria

- 1) Hydraulic criteria will be as taken from the tables included in the ADOT Highway Drainage Design Manual Hydrology dated March, 1993
- 2) No variances from accepted design procedures were used.

#### E Variances from this Manual

- 1) No variances from the design procedures recommended in the Yavapai County Drainage Criteria Manual were used.

## IV Drainage Facility Design

### A. General Concept

- 1) The parking lies to the east and north of the site with the proposed building centered and to the south of the site.
- 2) There is no off-site drainage onto the site.
- 3) The attached topography maps are simplistic in nature and require no explanation.
- 4) The proposed drainage patterns are for roof and parking drainage to run to the west and then south.
- 5) Due to the small nature of this project, excessive erosion during construction is not anticipated. However, straw bales or erosion control fencing must be installed at the west end of the site prior to the start of construction in accordance with the SWPP.
- 6) First Flush Detention Ponds will capture 1/2" of rainfall. Therefore no oil separator is required.
- 7) Water from the current buildings on 50 Oak Creek Boulevard will flow in its natural pattern and onto the lawn to the west and can be held in a first flush detention basin in the lawn if required. Much of this lawn is to remain. The roof drainage from the new four unit building on the east side will be captured in rain gutters and down spouts. This water will then flow south and into a proposed first flush detention area along the southern boundary of the property. The east parking area for the four units will also flow into the first flush detention pond at the southern boundary of the property. The west roof drainage will flow to the west, into gutters and down the down spouts and then flow westward across the existing lawn and if necessary into a first flush detention pond in the lawn.

### B. Specific Details

- 1) No drainage problems with respect to the proposed improvements have been encountered.
- 2) See the Site Plan.
- 3) Maintenance of the drainage ways are to be by the property owners.
- 4) No special drainage easements or tracts are required.

## V. Conclusions

### A. Compliance With Standards

- 1) Compliance with accepted drainage criteria standards has been maintained.

## B. Drainage Plan

- 1) It is not anticipated that the proposed development will negatively impact the existing drainage conditions.
- 2) The effectiveness of the proposed drainage design to control damage from storm runoff is adequate.

## IV. References

- 1) ADOT Highway Drainage Design Manual Hydrology dated March,1993

## VII. Appendices

### A. Hydrologic Computations

- 1) Determine Pre Development Q and Post Development Q:

Using the Rational Method:  $Q = CIA$

The difference between the Pre Development Q and the Post Development Q for the entire site is determined by the Rational Method. In the Post Development landscape areas the value C does not change from that of the Pre Development. Therefore the storm runoff, Q, in the landscape areas remains the same.

Accordingly, the difference between the Post Development Q and the Pre Development Q is determined in the hard surface areas. The value I and A in the Rational Method remain constant, while the value C is the variable in the Pre Development versus Post Development conditions.

C Pre Development equals 0.60

C Post Development equals 0.95

Accordingly, the Pre versus Post difference in C is as follows:

$$C=0.95-0.60=0.35$$

And the intensity value I is:

I=6.9, 100 year, 10 minute

I=5.1, 25 year, 10 minute

I=4.1, 10 year, 10 minute  
I= 2.5, 2 year, 10 minute

Since the value of C is the only variable and since the only area effected by the developed site are the hard surfaces, the value A to determine the difference in Pre versus Post for the entire site is for the hard surfaces only, as there is no difference in the C value for non hard surface areas. Accordingly:

A= 0.17 acres (Proposed Hard Surfaces @ 60 Oak Creek Blvd.)  
A= 0.05 acres (No Change in Existing Roof and Walk Hard Surfaces @ 50 Oak Creek)

The following are the differences in Pre versus Post Development Flows for the entire site:

$Q_{100,10} = 0.35(6.9)0.17 = 0.41$  cfs: (check Q for one hour event, below)  
 $Q_{25,10} = 0.35(5.1)0.17 = 0.30$  cfs  
 $Q_{10,10} = 0.35(4.1)0.17 = 0.24$  cfs  
 $Q_{2,10} = 0.35(2.5)0.17 = 0.15$  cfs

Q for a one hour event

Q for a 100 year, one hour storm with I =2.38 is;

$Q = 0.35(2.84)0.17 = 0.17$  cfs

Conclusion: Because the one hour storm event produces a Q of less than 1 cfs no detention pond is required by the City of Sedona. However, to accommodate the oil separation requirements and to allow for no increase of flow into the City V ditch, along Oak Creek Boulevard detention ponds have been included.

Detention Pond Calculations:

$Q_{100,10} = 0.41$  cfs or  $0.41 \text{ cfs} (60 \text{ sec/min.})(10 \text{ min.}) = 246 \text{ c.f.}$

and for first flush,

$0.17 \text{ acres} (43,560 \text{ s.f./acre}) (0.04 \text{ inches of rain}) = 296 \text{ c.f.}$

Design the retention first flush pond for the four unit building at 60 Oak Creek Blvd to a total of 296 c.f. capacity of which 38 c.f. is dedicated to west roof area.

Attachments

1) 24" by 36" Site Plan (Sealed by Brent Maupin, P.E.)

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## Trip Generation Report

For

Mike Reynolds Apartment Complex  
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APN 408-08-053 & 054

October 22, 2018

By



Date Seal October 22, 2018

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October 22, 2018

The subject property is located at 50 Oak Creek Boulevard and 60 Oak Creek Boulevard near the intersection of State Route 89A and Oak Creek Boulevard in Sedona, Arizona. The proposed project includes a new four unit apartment building, an existing three bedroom home, and a future 2 bedroom apartment. The property involved includes approximately 0.26 acres from 50 Oak Creek Boulevard and 0.30 acres of land from 60 Oak Creek Boulevard. The project will have up to 15 parking spaces.

## Trip Generation

The following data is based on the data provided in TRIP GENERATION MANUAL, 10<sup>th</sup> Edition as published by the Institution of Transportation Engineers.

Land Use 220, multi family low rise

### Weekday Average Vehicle Trip Ends:

Weekday average rate is 7.32 Trip Ends

7.32 trips per living unit or;

7.32 (5) = 36.6 Trip Ends (note the reduction factor of -40.86 not used as net result is less than zero)

### A.M. Peak Hour

The A.M. Peak Hour average rate is 0.46 Trip Ends;

0.46 trips per living unit or;

$$0.46 (5) = 2.3 \text{ Trip Ends}$$

#### P.M. Peak Hour

The P.M. Peak Hour average is 0.56 Trip Ends;  
0.56 trips per living unit or;

$$0.56 (5) = 2.8$$

Average Weekday Vehicle Trip Ends	A.M. Peak Hour Vehicle Trip Ends	P.M. Peak Hour Vehicle Trip Ends
36.6	2.3	2.8

#### CONCLUSION

The above anticipated Trip Ends were calculated using the weighted average Trip Generation Rate, as outlined in Volume 2 of the Trip Generation Manual, 10th Edition. The weighted average values used came from Volume 2: Data. Because there are only 5 living units proposed for this project at this time it was determined that it was best to use the weighted average values and not the regression equations. A 6th living unit may be added in the future but no significant traffic increase is expected. Please note that Oak Creek Boulevard intersects SR 89A. The ADOT 2017 Annualized Average Daily Traffic count (Pos Dir AADT) taken at this stretch of SR89A is 15,063. The anticipated 36.6 Trip Ends results in a 0.24 % increase, which is insignificant.